

Notice of Allowability

Application No.

09/892,918

Examiner

Nathan Curs

Applicant(s)

KAJIYA ET AL.

Art Unit

2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment of 23 November 2005.
2. ☒ The allowed claim(s) is/are 1-3, 5-7 and 9-14.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date 20051227.
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


M. R. SEDIGHIAN
PRIMARY EXAMINER

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Chad Billings on 20 December 2005.

- The claims of 23 November 2005 should be amended as follows:

Claim 1. (Currently Amended)

An optical transmission apparatus for transmitting an optical pulse string having a frequency two times that of a driving signal (fc), said optical transmission apparatus comprising:

- a Mach-Zehnder optical modulator;
- a light source which inputs an optical signal into said optical modulator;
- a driving unit which inputs the driving signal into the optical modulator;
- a converting unit which receives a frequency component of the driving signal (fc), takes out a part of an optical signal output from said optical modulator and converts that part of the optical signal into electric signal;
- an extracting unit connected to the converting unit, the extracting unit extracting the ~~which extracts~~ a frequency component of the driving signal (fc) included in the electric signal converted by said converting unit;
- an error signal generating unit which includes a level detector for detecting a level of the frequency component of the driving signal (fc) and a processing unit connected to said level

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detector receiving said frequency component and for generating an error signal based on the level detected by the level detector, the generated error signal being output to a digital to analog converter connected to the processing unit which converts the error signal from a digital error signal to an analog error signal the error signal generating unit generating the-generates an error signal of a bias voltage for minimizing a value of a frequency component of the driving signal (f_c) extracted by said extracting unit; and

a bias voltage control unit which applies a summed bias voltage obtained as a result of addition of the bias voltage and a voltage corresponding to the analog error signal to said optical modulator;

-wherein

~~modulation factor β of the Mach-Zehnder optical modulator is set as $\beta=2\pi$ and initial phase δ of the Mach-Zehnder optical modulator is set as $\delta=0$ for outputting the optical pulse string having a frequency two times that of a driving signal(f_c).~~

Claim 5. (Currently Amended)

An optical transmission apparatus for transmitting an optical pulse string having a frequency two times that of a driving signal (f_c), said optical transmission apparatus comprising:

a Mach-Zehnder optical modulator;

a light source which inputs an optical signal into said optical modulator;

a driving unit which inputs the driving signal into said optical modulator;

a converting unit which receives a frequency component of the driving signal (f_c), takes out a part of an optical signal output from said optical modulator and converts that part of the optical signal into electric signal;

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an extracting unit which connected to the converting unit, the extracting unit extracting ~~the extracts~~ a frequency component two times that of the driving signal (f_c) included in the electric signal converted by said converting unit;

an error signal generating unit which includes a level detector for detecting a level of the frequency component of the driving signal (f_c) and a processing unit connected to said level detector receiving said frequency component and ~~for~~ generating an error signal based on the level detected by the level detector, the generated error signal being output to a digital to analog converter connected to the processing unit which converts the error signal from a digital error signal to an analog error signal the error signal generating unit generating ~~the generates~~ an error signal of a bias voltage for maximizing a value of the frequency component two times that of the driving signal (f_c) extracted by said extracting unit; and

a bias voltage control unit which applies a summed bias voltage added with an the analog error signal of the bias voltage to said optical modulator, ~~wherein~~

~~modulation factor β of the Mach-Zehnder optical modulator is set as $\beta=2\pi$ and initial phase δ of the Mach-Zehnder optical modulator is set as $\delta=0$ for outputting the optical pulse string having a frequency two times that of a driving signal(f_c).~~

Claim 9. (Currently Amended)

A bias voltage control method for an optical modulator to be used for an optical transmission apparatus that inputs an optical signal into a Mach-Zehnder optical modulator, applies a driving signal and a summed bias voltage to said optical modulator, and transmits an optical pulse string having a frequency two times that of the driving signal, the method comprising:

receiving a frequency component of the driving signal (f_c);

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taking out a part of an optical signal output from said optical modulator and converting that part of the optical signal into an electric signal;

extracting a frequency component of the driving signal from the obtained electric signal;

detecting, by a level detector, a level of the frequency component of the driving signal (fc);

generating, by a processing unit connected to the level detector, an error signal of a bias voltage based on the level detected for minimizing a value of the frequency component of the driving signal, the generated error signal being output to a digital to analog converter connected to the processing unit which converts the error signal from a digital error signal to an analog error signal; and

applying a summed bias voltage obtained as a result of addition of the bias voltage and a voltage corresponding to the analog error signal to said optical modulator, ~~wherein~~

~~modulation factor β of the Mach-Zehnder optical modulator is set as $\beta=2\pi$ and initial phase δ of the Mach-Zehnder optical modulator is set as $\delta=0$ for outputting the optical pulse string having a frequency two times that of a driving signal (fc).~~

Claim 10. (Currently Amended)

A bias voltage control method for an optical modulator to be used for an optical transmission apparatus that inputs an optical signal into a Mach-Zehnder optical modulator, applies a driving signal and a bias voltage to said optical modulator, and transmits an optical pulse string having a frequency two times that of the driving signal, the method comprising: receiving a frequency component of the driving signal (fc);

taking out a part of an optical signal output from said optical modulator and converting that part of the optical signal into electric signal;

extracting a frequency component two times that of the driving signal from the obtained electric signal;

detecting, by a level detector, a level of the frequency component of the driving signal (f_c);

generating, by a processing unit connected to the level detector, an error signal of a bias voltage based on the level detected for maximizing a value of the frequency component two times that of the driving signal, the generated error signal being output to a digital to analog converter connected to the processing unit which converts the error signal from a digital error signal to an analog error signal; and

applying a bias voltage, added with a voltage corresponding to the analog error signal, to said optical modulator, ~~wherein~~

~~modulation factor β of the Mach-Zehnder optical modulator is set as $\beta=2\pi$ and initial phase δ of the Mach-Zehnder optical modulator is set as $\delta=0$ for outputting the optical pulse string having a frequency two times that of a driving signal(f_c).~~

Claim 11. (Currently Amended)

A method of making an optical transmission apparatus, comprising:

providing an optical modulator to output an optical signal;

providing a first signal generator to generate a driving signal for said optical modulator, said driving signal including a frequency component; and

providing a second signal generator to generate an error signal, the second signal generator including a level detector for detecting a level of the frequency component and a processor connected to said level detector receiving said frequency component and for generating an error signal based on the level detected by the level detector, said error signal

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being generated from the frequency component satisfying a predetermined threshold to generate a digital detection signal which is converted to an analog signal, by a digital to analog converter connected to said processor, indicating a change in a bias voltage to be input to said optical modulator;

providing a controller to generate the bias voltage, said bias voltage being generated from combining said error signal with a predetermined bias voltage;

wherein said bias voltage and said driving signal are being input to drive the optical modulator, ~~wherein modulation factor β of the Mach-Zehnder optical modulator is set as $\beta=2\pi$ and initial phase δ of the Mach-Zehnder optical modulator is set as $\delta=0$ for outputting the optical pulse string having a frequency two times that of a driving signal(f_c).~~

- In addition, the claims of 23 November 2005 should be amended as follows:
 - Claim 3:
 - In line 2, "light having different" should be changed to "light having a different".
 - In line 6, "different wavelength" should be changed to "different wavelengths".
 - Claim 4 is canceled.
 - Claim 7:
 - In line 2, "light having different" should be changed to "light having a different".
 - In line 6, "different wavelength" should be changed to "different wavelengths".
 - Claim 8 is canceled.

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- Claim 12:
 - In line 2, "greater than value of" should be changed to "greater than the value of the".

Conclusion

2. Any inquiry concerning this communication from the examiner should be directed to N. Curs whose telephone number is (571) 272-3028. The examiner can normally be reached on M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached at (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (800) 786-9199.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pairdirect.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


M. R. SEDIGHIAN
PRIMARY EXAMINER